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VACCINATION

IMPARTIALLY REVIEWED.



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VACCINATION

IMPARTIALLY REVIEWED.

BEING ONE OF THE PRIZE ESSAYS SENT IN TO THE
LADIES' SANITARY ASSOCIATION.

BY

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"Per varios usus artem experientia fecit
Exemplo monstrante viam."—MANILIUS.



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V A C C I N A T I O N

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1st. *The actual value of vaccination as a preventive of smallpox; embracing in this part the question whether vaccination, as a preventive, retains its power.*

2nd. *The dangers of vaccination from the introduction of other diseases into the organism, and the extent to which the value of vaccination is reduced by such dangers.*

PHILOSOPHERS have ever been guilty of two grave errors—they have either endeavoured to pursue nature into infinity, or they have sought to establish an absolute rule ~~there~~ where no positivity could exist. Both were alike mistaken, for if, as finite beings, we are limited to a certain range of research, beyond which we cannot trespass without treading upon the perilous and fallacious grounds of mystic speculation, we, on the contrary, by vainly setting up the absolute where all is transmutation and advancement, violate one of the greatest laws of

nature—the law of progressive development. The absolute is nowhere but with the Most High, with whom eternity and infinity are one; and he who seeks for the positive in the physical and mental world cherishes an ideal which it was never given to man to realise. Philosophy, the sciences, the arts, religion and morals, all bear testimony to this truth, and their systems, theories, schools, creeds and principles, to whatever height they may have attained, have alike been thwarted in their aspirations to the perfect, sharing in their shortcomings the fate of all that is human. How much less can we expect to see medicine free from fallacy, and why should physicians try to attempt to do more than their brethren in the pursuit of knowledge? Our science, partaking at once of the abstract and the intuitive, is, perhaps, of all the most vague and unsatisfactory; and in dealing with diseases and their remedies we have not only to overcome the infinite diversity and polymorphism of nature, but also to grapple with powers and influences as unknown to us as they are subtle. But in order to be more explicit, it is imperative we should review the question at issue in its different bearings, and consider the origin of disease in general, the power exercised by certain illnesses to protect the individual against any repeated attacks of the same, and, finally, offer

a few suggestions regarding the true definition of a prophylactic.

There can be but little doubt that we are possessed of two distinct organisms, accurately corresponding to each other in their minutest details—the one invisible, being immediately contiguous to the organic or vital power; and the other visible, subservient to the requirements of our earthly life. The former is permanent, and does not quit the spirit even when it has left its present tenement, occupying, as though it were, an intermediate relation between the soul and the outward tangible organism, to the partly mineral character of which we are chiefly indebted for the maintenance of our individuality, which, but for such a support, would either be greatly imperilled or altogether lost.

The chief duty, however, the organism has to perform is to act as a mediator between the outer world and the vital power, and to assimilate the countless influences and tendencies that beset it, in such a way that they shall not reach it or its ethereal surroundings in a crude or unprepared state. If this office is performed undisturbed by the whole machinery, and each individual organ acts the part assigned to it with unvarying regularity, the assimilative operations of the economy are carried on imperceptibly, and without any apparent impediment;

but if at some spot or other the organism happens to be weak, its mediative function becomes, to a certain extent, suspended in that particular locality, leaving the system open to the influx of a foreign element, which, being permitted to pervade the body in a crude or unassimilated state, produces in it those various disturbances, both dynamic and physical, known by the name of disease. It is therefore clear that the morbidic elements are not originally noxious in themselves, but become secondarily so by the manner in which they are permitted to penetrate into the system; hence, excessive heat, cold, or moisture, or the mere vicissitudes of temperature, may give rise to acute attacks of illness, without either of these agents necessarily containing anything obnoxious to the system in their character.

Diseases are also as diversified as there are elements by which we are surrounded, and their complications may be easily explained by supposing that two or more elements may penetrate into the body at different points, as well as by studying the relations that maladies bear to each other, or to a portion of the organism to which they are akin, either immediately or by polaric affinity. It would take us beyond the limits of this subject were we specially to dwell upon each individual malady, together with

its nature and causes; we therefore at once pass over to those diseases which exert a preservative influence upon the economy, rarely occurring in the same subject more than once.

These are the so-called zymotic illnesses specially incidental to childhood; they offer so wide a field for speculation in a pathological point of view, and the topic, moreover, is of such vast importance in itself, that we must be pardoned for introducing it at greater length, even at the hazard of being considered somewhat prolix. The same as the crystal in the mineral kingdom is the element to which all forms, however complex, may be reduced, so in the animal and vegetable realms we may regard the cell as the earliest visible formation, out of which the manifold and marvellous structures of the living world perpetually arise. As these cells unite amongst each other by the law of attraction, a parenchyma is produced, which in plants is developed into the leaf (the type of all vegetable formation), and in the animal creation expanded into membrane, the element from which all the future tissues are developed. Thus, the membranous system in general is of the most extended significance in the animal economy, partly as the foundation from out of which all organic structures have arisen, and partly because the different tissues belonging to it perform the

double office of lining and secreting surfaces; but of all these, the cutis, or skin, properly so called, is of the greatest significance, not only as the outer integument of the body, constituting the boundary line between the organism and the surrounding elements, but also as being the highest development of the membranous tissues, its exquisite sensitiveness and aptitude to convey the impressions from without to the mind being amongst others its most prominent features. From its perpetual exposure to the atmosphere, it is only too open to be assailed by a variety of the cruder elements that surround it, and these attacks are, of course, the more readily resented as, owing to its sensitive character, every rude assault from without is felt with greater keenness.

Further, the skin, as the external covering of the body, stands as much in relation to the outer world as to the organism itself, and has thus imposed upon it a twofold office, the office of secreting what is unfit for the purposes of the economy (by the exhalation of moisture, and the deposition of sebaceous matter, &c.), and receiving from without those elements which are requisite for the carrying on of the manifold processes by which our vital existence is maintained; this, amongst others, it chiefly does in admitting the atmospheric air, by which a continual process of surface oxidation is kept up. It is ob-

vious, therefore, that, in order that the health and well-being of the organism should be established, an uninterrupted and normal relation of the skin to the outer and inner world should subsist ; and hence it is that during the earlier period of life the cutaneous surface has to become habituated to so many unkindly influences, giving rise to the numerous eruptions to which children are so commonly obnoxious. But, besides the action of the atmosphere, or that of heat, cold, moisture, electricity, &c., there are other more subtle elements of which we know no more than that they seem to constitute a necessary condition in the air, and to which it is requisite that the skin should become befriended if the course of its development is to continue uninterrupted ; hence their invasion is invariably followed by a constitutional disturbance or sickness, which, when over, leaves the system, and the skin in particular, in so altered and modified a condition as to be able to endure their presence without any further ill-effect. Such are the eruptive diseases of childhood, as measles, scarlatina, smallpox, &c., and also hooping-cough, which is by many regarded as an exanthem of the respiratory organs. The immunity afforded by these maladies is indeed truly remarkable, and can only be explained upon the supposition that, as they are evils necessarily to be endured for the fuller

development of the cutaneous system, that process of neutralisation once over, they do not readily return, which is also, in part, a reason of their being diseases chiefly incidental to early life, the years of childhood being peculiarly those of growth and expansion.

There are other diseases also which rarely occur again; but as they are chiefly those of adult age and acclimatization, the immunity they afford is by far not so great as in the former case, the attacks commonly returning upon the individual revisiting the locality, or the morbid virus assailing the organism with overwhelming violence; such are certain endemic diseases, as yellow fever, and its kindred; diarrhoea, peculiar to some places, as St. Petersburg, for instance; some forms of ague and abdominal or typhoid fever, which, according to modern writers, but rarely appear a second time. If, in every instance, the zymotic illnesses ran a mild and even course, they might, as the protection they exert with regard to any future attack is so considerable, properly be regarded as a necessary evil, to be patiently endured for the immunity they afford to the individual; but such is unhappily not invariably the case, and there are very few that have not either suffered from or are not acquainted with the numerous ills to which they give birth, exclusive of the excessively fatal character of some of the epidemics,

as frequently witnessed in scarlatina and smallpox. Much has and certainly can be done to avert these calamities by preventive measures, as ventilation, drainage, disinfectants, cleanliness, regimen and diet, as also to ward off the more serious consequences, when they do occur, by an appropriate treatment. But in order to discover a specific prophylactic, applicable in each instance, we must needs pursue the course pointed out to us by nature, and endeavour to find out an infection that, like the one we are desirous of averting, shall modify the constitution in a similar manner, so that when the dreaded poison assails the system it finds it in a condition to withstand its attack, or rather to receive it as an element to which the organism has already been rendered familiar. Homœopathy has attempted to solve this problem by its symptomatic parallel; but the belladonna recommended by Hahnemann, according to his own statement, only applies to one form of scarlet fever (*scarlatina glabra*, Sydenham; *rother Hund*), besides which the parallel is not sufficient, and the remedy, as a vegetable extract, too little akin to the malady to be of much real service, exclusive of the effect it has, if given in larger doses, of interfering with the proper development of the eruption, not infrequently to the prejudice of the patient.

It is, therefore, from the utter impossibility of analysing the morbid poisons, and in default of a leading principle to teach us to discover the analogy existing between the disease and the remedy, that we are compelled to fall back upon the process of induction and direct experiment, unless Providence intervenes, and either intuitively, in moments of exuberant inspiration, or by a fortuitous occurrence, leads us to discoveries which, without this aid from above, could, in spite of all our exertions and speculations, never have been made. It is thus the deepest truths in science and philosophy have been discovered, and thus that seemingly trivial incidents, by being duly brought to light, have, at different times, proved of incalculable blessing to the human race.

The eruption noticed on the hands of the milkmaids, which was asserted to protect them against any eventual attack of smallpox, was the first incentive that originated in the mind of the illustrious Jenner the thought that in the cow-pox might probably be found a prophylactic for the smallpox. Thoroughly engrossed with this idea, he at once put it to the test of experiment, by inoculating the lymph taken from the cow into the human subject, which proved so effective a protection against variola as soon to convince him of the truth of his hypothesis; but, like all new discoveries, it was not

merely left unheeded by the public, but had, in the beginning, to encounter even the most embittered opposition, and it was only after many years' struggle that the logic of his theory was admitted, and the practice of vaccination universally adopted. But though vaccination has been of incalculable value in preventing the spread of the smallpox, which, previous to the discovery, committed such fearful ravages, branding or destroying its victims with unsparing cruelty, yet the benefit that it confers is not altogether of that unexceptional, that absolute, kind, as to entitle us to pronounce its prophylactic virtues to be of an unfailing and unalterable character. The cow-pox is not a disease natural to man, but its inoculation is practised with the object of introducing a virus sufficiently powerful to forestall the inroads of another, though similar, disease ; however, it being thus used as a prophylactic amply establishes the mildness of its character and the readiness in which it fraternises with the economy, yet it is just from these more genial virtues which render it so highly valuable as a preventive, and the almost negative resistance offered to its introduction by the organism, that it refuses to lay so deep a hold upon the human economy as is the case with regard to the smallpox, the invasion of which is not only followed by a revolution in the system of a grave and

often fearful character, but, even where recovery takes place, by so thorough a metamorphosis in the conditions of the skin as scarcely ever to occur again in the same subject. It is thus easy to conceive how the cow-pox, in every respect a mild infection, may at times disappoint our expectations, and that individuals, in spite of the most careful and even repeated vaccination, may, not infrequently, be subject to an after-attack of modified or genuine small-pox, which can only be explained upon the supposition that, after the lapse of a certain period, the dynamic influence of the virus has been annihilated, causing the skin to return to its pristine condition, or, in other words, that the infection has worn itself out. This defect is not peculiar to vaccination alone, but it possesses it in common with all prophylactics the characteristic of which it is to forestall a heavier sickness by substituting a milder form of disease instead; thus, according to the idiosyncrasy of the subject or some unexplained property inherent in the virus itself, &c., vaccination may have to be renewed at longer or shorter intervals, and that this is occasionally requisite has been amply proved by the numerous experiments made on the subject in the Prussian and French armies, as well as in the different cow-pox institutions established in Great Britain and other countries. The usual range of

its efficacy is generally admitted to extend from over seven to one and twenty years; but where vaccination has been performed upon both arms, and a sufficient number of pustules, say from four to five, have been developed, of which two or three have been allowed to remain undisturbed, its power of retention may be extended over a much longer period, and even through a whole lifetime.

Where, however, these precautions have not been adopted, the epidemic of smallpox is of an unusually severe character, and the patient of an apprehensive timorous disposition, I am in the habit of recommending a second, though rarely a third, vaccination. In schools, barracks, prisons, asylums, &c., where the infection is likely to spread over a great number of individuals accumulated in the same building, re-vaccination should on no account be neglected, the objections to its employment being incomparably less than the evils that would arise from the discarding of so simple a measure. This is fully confirmed by the recent report of M. Danet, physician to the Ministère de l'Intérieur, made to the Academy of Medicine at Paris, though I do not hold with the necessity of re-vaccination after an attack of smallpox. But there are minor reasons why vaccination sometimes fails to be successful,

which we shall endeavour to give with as much clearness and brevity as we can.

There are many individuals of so delicate a constitution, either originally or from hereditary taint, as greatly to enfeeble their powers of assimilation ; in such the preservative power of vaccination would be considerably deteriorated, rendering it impossible for it to do more than afford a partial protection to the individual, so that in later years, and when their systems have become more fortified, they are as open, or almost so, to attacks of variola, as though the operation had never been performed. Some undergo a change of constitution, requiring a repeated vaccination to render them immune ; a change of climate, too, might beget an increased susceptibility. It may also happen that the epidemic of smallpox, to which the individual is exposed, is of a particularly virulent character, whilst the vaccine virus might, in that special instance, have been unusually mild.

There are individuals so intensely sensitive as for ever to be open to obnoxious influences ; with such the protective power of vaccination would likewise prove abortive. A sudden shock to the system, or an insurmountable dread of contagion, will often undo the salutary effect of vaccination, inducing an immediate attack of smallpox, a phenomenon which

can only be explained by supposing that the equilibrium of the economy has been momentarily deranged; instances of this kind have come under the author's personal observation. Further, vaccination might have been incomplete from having been performed on *one arm only*, or from too small a number of pustules having been developed, or the lymph might, from having been badly preserved, or from some unexplained cause or other, have become weakened in its intensity, and, though able to produce a seemingly genuine pustule, would only extend its protective properties over a limited period of time. An after-attack of smallpox might also ensue in spite of previous vaccination, from numerous depressing causes to body and mind, which have so large a share in the predisposing of the system to unforeseen invasions of illness.

We now proceed to the consideration of the second part of the question, *i. e.* the danger of vaccination from the introduction of other diseases into the organism, and the extent to which the value of vaccination is reduced by such dangers. Though the introduction of vaccinia is scarcely, if ever, followed by any consequences of a serious nature, yet there can be no doubt of its becoming the source of much and often permanent evil, if suffered to enter

the system in an impure form; sad instances of this kind frequently come under the notice of the physician, and many a constitution, originally sound, has been blighted or altogether undermined by the presence of an unrecognised virus, with which the lymph has happened to have been tainted. Of all diseases which may be communicated to the subject by vaccination, syphilis is the most to be dreaded, partly from its exceeding prevalence in every form and variety, being even extended to subsequent generations by inheritance, and partly from the facility with which it joins to other morbid agents, and the insidious manner in which it is developed in the constitution when thus introduced. A very distressing accident of the kind only recently occurred in France, where, according to the remarkable report made by MM. Depaul and Roger, an outbreak of vaccinal syphilis was witnessed among sixty-two infants (see 'Medical Times and Gazette,' March 2nd, 1867, page 231), a statement in the correctness of which I have not the least doubt, as I have occasionally observed the development of an unmistakable syphiloid eruption subsequent to vaccination. Whether the germs of psora and other eruptive diseases are transmitted from one organism to the other by vaccinia, or whether a subsequent tendency to tubercular, cancerous, and other similar deposits

in the tissues, or that peculiar morbid condition in the lymphatic and glandular system, so ripe amongst children in these days, may either spring from or be unduly nourished by the same agent is, in the present state of our knowledge, no easy matter to determine, but, from the experiments made by M. Villemin on the inoculability of tubercle, and repeated by Dr. Andrew Clark at the time of their publication, it is more than probable that the like evils may not infrequently arise as the result of careless vaccination, especially when we consider how often these pathological conditions are apt to occur, and how manifold is the variety with which they are exemplified.

All these circumstances must greatly tend to modify the actual benefit to be derived from vaccination as a prophylactic, and require the more consideration as, under the existing sanitary state of the human race, as well as under the present system of vaccination, it is next to impossible wholly to avoid the introduction of such extraneous elements, prejudicial as they must eventually become to individuals in every way of sound habit and the best able to cope with potent toxic agents like these.

Finally, as, according to modern pathology, every disease is supposed to be the carrier of its own individual poison, as in zymotic and other illnesses, so

also must vaccinia be distinguished by a special morbid character, with a greater or lesser tendency to form a lower plastic centre in the economy. Small as this effect virtually is, it may, nevertheless, become the source of subsequent evil, and in some degree tend to deteriorate the actual value of vaccination.

Such is the summary of the principal objections which have from time to time been raised with regard to the inoculation of the cow-pox as a safeguard against variola; and though it cannot be denied that the arguments brought forward by its opponents are not altogether devoid of foundation, yet the benefit that has accrued from its introduction is so indisputable, and has proved ~~of~~ so incalculable a blessing to mankind, as far to outweigh the lesser evils that appear in its train, evils which, being greatly the result of inadvertence, mismanagement, and neglect in studying the question in all its bearings, might either wholly be overcome or considerably mitigated by the adoption of appropriate measures, framed with the twofold object of satisfying the wishes of the public and meeting the exigencies of the case. With regard to the latter, direct vaccination from arm to arm is the first practical step to be taken, as not only the readiest means of communicating the infection, but also the most

efficacious method of securing the desired number of pustules.

Another question of no less importance is the periodical renovation of the lymph from the cow, a process to which there can in reality be no objection, as, besides a slight increase in the febrile action and a greater development of the pustule, it is entirely devoid of all danger ; on the contrary, vaccination direct from the cow possesses the double advantage of furnishing an unlimited supply of lymph, the soundness of which is beyond all dispute, as well as ensuring by its purity for a series of subsequent transmissions a thoroughly potent and unalloyed infection.

Next, we should be perfectly satisfied that the subject furnishing the lymph be of an unexceptional constitution, and free from every trace of disease. From the freshness of their organisms, and the comparatively short period to which they have been exposed to extraneous influences detrimental to health, infants or very young subjects should, as a rule, be selected as mediums for transmitting the virus ; but where the lymph is taken from adults we should be careful, if females, not to abstract it during menstruation and whilst they are in the pregnant state. The lymph used should be perfectly pure and unmixed with pus, from the fifth to the

seventh day being the best time to open the pustule; delicate children should, for obvious reasons, not be vaccinated until they have grown sufficiently strong to bear the operation without any ill-effect. Where preserved lymph is employed it is best taken from capillary tubes.*

If carefully and hermetically sealed, the virus may be kept in this way for a very considerable period without damage. I have myself used lymph after three years' preservation, which had been exposed to alternate ranges of heat and cold, having even been sent so far north as Siberia and back with perfect success. Ivory points require the nicest management, and are only to be relied on when recently charged. The dried scabs moistened are altogether objectionable, as apt to produce spurious pustules, and being uncertain in their effect. Thus it is evident that the requirements for a safe and effective vaccination are altogether of a very simple character, and it is much to be regretted that no uniform system of cow-pox inoculation has as yet been generally adopted.

* Capillary tubes should, according to some writers, be made of yellow glass, to preserve the lymph from exposure to light; I have myself caused this to be done in an imperfect manner by having them placed in cork or wood, hollowed out and filled with sawdust, which, moreover, had the double advantage of preserving the tubes from accident and keeping the lymph at an even temperature.

Though public institutions of the kind exist in the larger cities of the United Kingdom, the inhabitants of the lesser towns and villages are mostly dependent upon private or dispensary vaccination, which, though it may in most instances be conscientiously performed, must, of necessity, be more liable to the objections just enumerated than when practised in public institutions, establishments where every means have been employed to obtain the virus in its purest form, and to prevent it from being contaminated with other vitiated matter.

The public vaccinators should all be men of considerable experience, in every way worthy of the trust, and at the same time adequately remunerated for their trouble. Though, according to Acts of Parliament, vaccination has been made compulsory, yet the masses have not been sufficiently provided with the means of ensuring the best virus for their children; the medical men attached to the dispensaries and unions, besides being often young and inexperienced practitioners, are, in many instances, so overwhelmed with work as hardly to be able to give their undivided attention to this all-important subject of public hygiene, which is the more to be deplored as it is, in a great measure, the lymph from the humbler classes, afflicted with all kinds of disease, which is thereby not only multiplied to a fearful

extent in their own sphere of life, but is perpetually finding its way into the upper ranks of society. This, I apprehend, is one of the strongest objections that can be brought against vaccination, and an evil the more to be deplored as its ramifications not only extend over a very wide range, but considerably helps to damage the reputation of so invaluable a prophylactic. For all this, we repeat, there is no other remedy than public vaccination, conducted by competent officials, and under the supervision of an unimpeachable tribunal. If the smallpox had altogether died out, as has happened with other epidemics in course of time, or if it had become of so rare an occurrence as almost entirely to have lost its alarming character, the opponents of vaccination would be amply justified in declaring against its continuance, and in refusing to have it performed either upon themselves or upon their children, as sometimes happens abroad, where, in spite of an annual fine imposed by government upon those refusing to conform to the vaccination laws, some actually prefer regularly paying the fine to having their children inoculated with the cow-pox; but so far from this being the case, whenever vaccination has been neglected, the variolous tendency immediately begins to reappear, followed by epidemics of smallpox exhibiting all the dreaded characteristics as of old.

It is quite conceivable that in localities where vaccination has been all but universally practised for a considerable period, isolated instances may occur of individuals altogether escaping the infection of smallpox without having submitted to this precautionary measure, from the fact of the variolous element having been, so to speak, kept at bay, no opportunity being afforded for the materies morbi to develop itself in the human subject; but an occasional immunity like this would never justify the masses to evade the vaccination laws, and wilfully to reject so priceless a benefit as was bestowed upon us by the discovery of the immortal Jenner. Previous to concluding, I cannot refrain from briefly alluding to the obsolete inoculation of the smallpox, a practice only justifiable when vaccination, as often happens among the negroes and coloured races, is found wholly to fail, or is for the most part rendered nugatory by the overwhelming influence of the variolous poison, which in the lower races of mankind, where the skin is but imperfectly formed and, so to speak, in a transition state, is only too readily lowered in its vitality by the ingression of a potent toxic agent, such as exists in the smallpox. I speak from experience, and from having conversed with medical men whilst residing at the Cape of Good Hope, where the smallpox, if once unhappily intro-

duced amongst the negroes and hottentots, not only spreads with frightful rapidity, but immediately assumes a confluent gangrenous type, being fatal to an imminent degree; here a mild substitute, like vaccinia, would probably, in most instances, prove abortive, the inoculation of the smallpox alone being sufficiently potent to mitigate the character or stay the progress of the epidemic; but instances like these are only exceptional, for in temperate climates like ours, vaccination has been found to be an effective prophylactic, more especially as its employment, provided the lymph be pure, is never attended by consecutive or metastatic illnesses of any great significance. So long, therefore, as we are in possession of no internal prophylactic calculated to forestall the advent of this dread disease, or have discovered no specific to neutralise the virulence of its action, we should acknowledge the great boon bestowed upon us by vaccination with thankful hearts, and, far from being discouraged by any objections against its use brought forward by its opponents, not only willingly submit to its being performed upon ourselves and families, but at the same time use our utmost endeavours to render its adoption as universal as possible, both for the benefit of present and subsequent generations.

